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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/537,069

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Michael Collins

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EXAMINER

CHAN, HENG M

ART UNIT

PAPER NUMBER

4181

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/537,069	<b>Applicant(s)</b> COLLINS ET AL.	
	<b>Examiner</b> HENG M. CHAN	<b>Art Unit</b> 4181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-96 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-96 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/31/2005</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

As a result of Applicant's amendment to claims, restriction was withdrawn and all claims are examined on the merits.

### ***Drawings***

Figures 6 and 7 are objected because the y-axis label is partially missing.  
Appropriate correction is required.

### ***Specification***

The disclosure is objected to because of the following informalities:

1. "Active nickel powder (A)" in the brief descriptions of Figures 7 and 8 is not clearly defined or referred to.
2. "Nickel powder (B)" in the brief description of Fig. 7 is not clearly defined or referred to.

Appropriate corrections are required.

### ***Claim Objections***

The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims

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are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

**Misnumbered claims 53-86 have been renumbered 52-85. Misnumbered claims 88-96 been renumbered 86-94 under Rule 126. Dependency of the misnumbered claims was changed correspondingly, when necessary.**

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 10, 14, 22, 24, 56, 60-61, 67, 72, 73, 83, 87 and 92 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 recites the limitation "step c)" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 14 recites the limitation "reducible nickel salt" in line 2. It is unclear whether the limitation refers to nickel chloride in claim 1 or any reducible nickel salt. If the latter, there is insufficient antecedent basis for this limitation in the claim.

Claim 22 recites the limitation "in excess of between 35 and 100 m<sup>2</sup>/g" in line 2. It is unclear what the claimed range is.

Claim 24 recites the limitation "the reducible nickel salt" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 60 recites the limitation “reducible nickel salt” in line 2. It is unclear whether the limitation refers to nickel chloride in claim 1 or otherwise.

Claims 56, 61, 67, 72, 78, 83, 87, and 92 recite the limitation “step b)” which appears to refer to the step b) prior to the latest claim amendments, as the claims refer to reducing conditions that are irrelevant to step b) in the current claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-13, 15-17, 19-22, 24, 26-31, 33, 36-42, 44-51, 53-59, 61, 64-70, 72, 75-81, 83-90, and 92-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent no. 7,198,770 to Khozan et al., in view of US Patent no. 2,677,607 to Graham et al.**

Regarding claim 1, Khozan et al. teaches a method comprising:

- Providing a nickel carbonate/nickel chloride mixture;
- Reducing the mixture with hydrogen gas at 450 °C; and
- Recovering the resulting nickel (abstract; Example 3).

Khozan et al. does not specifically teach that the nickel carbonate/nickel chloride mixture comprises a surface area in excess of about 1 m<sup>2</sup>/g.

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Graham et al. also relates to a process of reducing nickel chloride to form substantially pure commercial nickel with a reducing gas essentially consisting of hydrogen gas and hydrogen chloride, at a temperature in the range of about 450 °C to about 650 °C (column 1, lines 1-12; claim 1). Graham et al. teaches that the nickel-containing material is preferably suitably comminuted, in any desired way and by any desired mechanism to some small particle size such that a reasonably intimate gas-to-solid contact is afforded. The particle size is not critical, but smaller particle size material affords better gas-to-solid contact in most instances. It is contemplated, for example, that material in the order of about 30 to about 100 mesh would be suitable (column 4, lines 24-40).

Although Khozan et al. and Graham et al. do not specifically teach using a surface area in excess of about 1 m<sup>2</sup>/g, the absence of such a specific teaching would clearly suggest to the skilled artisan that any surface area can be used. In view of this, it would have been obvious to one of ordinary skill in the art at time of invention to have used any desirable surface area of the nickel material (*i.e.* nickel chloride) in the method provided by Khozan et al., in order to ensure a reasonable intimate gas-to-solid contact just as Graham et al. obtained smaller particle size for better gas-to-solid contact by comminuting the nickel material.

Regarding claim 2 and 21, Khozan et al. teaches the method as discussed above and that the nickel carbonate/nickel chloride mixture has a 10:1 w/w ratio (Example 3). That is, the weight ratio of chloride to total nickel is greater than 0.1.

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Regarding claim 3, Khozan et al. teaches the method as discussed for claim 1 above and uses a hydrogen gas doped with 1% HCl (Examples 3 and 4; column 3, lines 4-6).

Regarding claims 4 and 94, Khozan et al. teaches the method as discussed for claim 1 above and provides a chloride anion which may be selected from, for example, a metallic chloride salt such as  $\text{FeCl}_3$  (column 2, lines 20-23 and 56-59).

Regarding claim 5, Khozan et al. teaches the method as discussed for claim 1 above and treats the resulting nickel with carbon monoxide at essentially atmospheric pressure to form nickel carbonyl (Example 3; column 2, lines 26-29).

Regarding claim 6, Khozan et al. teaches the method as discussed for claim 2 above and treated the resulting nickel with carbon monoxide at essentially atmospheric pressure to form nickel carbonyl (Example 3; column 2, lines 26-29).

Regarding claim 7, Khozan et al. teaches the method as discussed for claim 3 above and treated the resulting nickel with carbon monoxide at essentially atmospheric pressure to form nickel carbonyl (Example 3; column 2, lines 26-29).

Regarding claim 8, Khozan et al. teaches the method as discussed for claim 4 above and treated the resulting nickel with carbon monoxide at essentially atmospheric pressure to form nickel carbonyl (Example 3; column 2, lines 26-29).

Regarding claims 9, 28, 39, 48, 56, 67, 78, and 87, Khozan et al. teaches that the reduction with hydrogen gas is performed at 450 °C (Example 3). Claims 56, 67, 78, and 87 are interpreted that reduction with hydrogen is performed at temperatures between 300 °C and 600°C.

Regarding claim 10, the instant claim is interpreted that the step of contacting the resulting active nickel powder with a gas containing carbon monoxide at atmospheric or super atmospheric pressure to obtain nickel carbonyl is performed at temperatures between 20 °C and 100 °C. Khozan et al. teaches using 80 °C (Example 3).

Regarding claims 11, 29, 40, 49, 57, 68, 79, and 88, Khozan et al. teaches using a source nickel that may readily be selected from, for example, a nickel salt, carbonate, hydroxide, oxide and metallic elemental nickel and that the metallic elemental nickel is preferably in a very fine powder form (column 2, lines 49-56). This suggests that the nickel compounds are dry.

Regarding claims 12, 30, 41, 50, 58, 69, 80, and 89, Khozan et al. teaches using a nickel carbonate/nickel chloride mixture (Example 3).

Khozan et al. does not expressly teach wet mixing components and then removing the water by drying.

However, it would have been obvious to one of ordinary skill in the art at time of invention to have wet mixed components such as nickel carbonate and nickel chloride as they are both soluble in water and then removed the water by drying, in order to generate a more uniform dry mixture as that used by Khozan et al. for even gas-to-solid reaction.

Regarding claims 13, 31, 42, 51, 59, 70, 81, and 90, Khozan et al. teaches using a nickel carbonate/nickel chloride mixture in the presence of hydrogen doped with HCl (Example 3).



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Khozan et al. does not expressly teach wet mixing components in the presence of HCl.

However, it would have been obvious to one of ordinary skill in the art at time of invention to have wet mixed components such as nickel carbonate and nickel chloride in the presence of HCl, in order to thoroughly incorporate HCl into the mixture by, for example, bubbling HCl gas into the wet mixture.

Regarding claims 15, 33, 44, 53, 61, 72, 83, and 92, Khozan et al. uses hydrogen gas (Example 3). Claims 83 and 92 are interpreted that a reducing gas comprising hydrogen is used in the reduction step.

Regarding claim 16, Khozan et al. treats the nickel carbonate/nickel chloride mixture with hydrogen at 450 °C, which is above the boiling point of water. That is, if one of ordinary skill in the art at time of invention had chosen to perform the method of claim 12, the drying portion and the reduction step would have been conducted concurrently.

Regarding claim 17, Khozan et al. reduces the nickel carbonate/nickel chloride mixture with hydrogen (example 3), which may suggest that the mixture is provided before reduction.

Regarding claims 19, 20, 36, 45, 54, 64, 75, 84, and 93, Khozan et al. teaches that activation of nickel has been observed in the presence of hydrogen (column 1, lines 24-26). The claimed temperature condition is known from the reduction step in claim 1.

Regarding claims 22, 27, 38, 47, 55, 66, 77, and 86, Khozan et al. does not specifically teach using a surface area in excess of between 35 and 100 m<sup>2</sup>/g.

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The absence of such a specific teaching would clearly suggest to one of ordinary skill in the art that any surface area can be used. In view of this, it would have been obvious to one of ordinary skill in the art at time of invention to have used any desirable surface area of the nickel material (*i.e.* nickel chloride) in the method provided by Khozan et al., in order to ensure a reasonable intimate gas-to-solid contact just as Graham et al. obtained smaller particle size for better gas-to-solid contact by comminuting the nickel material (see claim 1).

Regarding claim 24, Khozan et al. teaches using nickel chloride (Example 3).

Regarding claims 26, 37, 46, 65, 76, and 85, Khozan et al. teaches using nickel carbonate (Example 3).

**Claims 14, 23, 32, 43, 52, 60, 71, 82, and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khozan et al., in view of Graham et al., further in view of US Patent no. 3,672,873 to Huggins et al.**

Regarding claims 14, 23, 32, 43, 52, 60, 71, 82, and 91, Khozan et al. does not expressly teach adding alkali to an aqueous solution of reducible nickel salt, and then removing the water by drying. Khozan et al. does not expressly teach using  $\text{Na}_2\text{CO}_3$ .

Huggins et al. also relates to a process of precipitating nickel as reducible compounds, e.g., basic carbonates, reducing the compounds and then treating the reduced metal products with carbon monoxide at superatmospheric pressures to evolve nickel carbonyl (abstract). Huggins et al. teaches that the basic carbonates of nickel can

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be produced by treating nickel salt solution with water-soluble carbonates or bicarbonates, such as sodium carbonate or sodium bicarbonate (column 3, lines 60-67).

Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to have added alkali such as sodium carbonate to an aqueous solution of reducible nickel salt and then removing the water by drying, in order to produce nickel carbonates as precursors for the reduction reaction and the subsequent reaction with carbon monoxide as described by Huggins et al.

**Claims 18, 25, 34-35, 62-63, and 73-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khozan et al., in view of Graham et al., further in view of GB 1,099,464 to Lingwood (Applicant's admitted prior art).**

Regarding claims 18, 25, 34-35, 62-63, and 73-74, Khozan et al. does not expressly teach that nickel chloride is in the form of hydrates of nickel or that the hydrate of nickel is  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ .

Lingwood also relates to hydrogen reduction of many metal compounds including nickel chloride (page 1, right, lines 47-55). Lingwood teaches using  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$  (example 3).

Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to have used hydrates of nickel or  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ , specifically, in the method provided by Khozan et al., motivated by the fact that Lingwood uses  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$  in the same process and the skilled artisan would have obtained predictable success by simple substitution of a known element with a different form thereof (*i.e.* hydrate form).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HENG M. CHAN whose telephone number is (571)270-5859. The examiner can normally be reached on Monday to Friday, 8:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HMC  
Examiner, Art Unit 4181

/Vickie Kim/

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Supervisory Patent Examiner, Art Unit 4181